



1.0 Design Specifications

Inputs	Outputs #1
VinMin=21.6	Vout1=20.4
VinMax=26.4	Iout1=0.33

2.0 Design Description

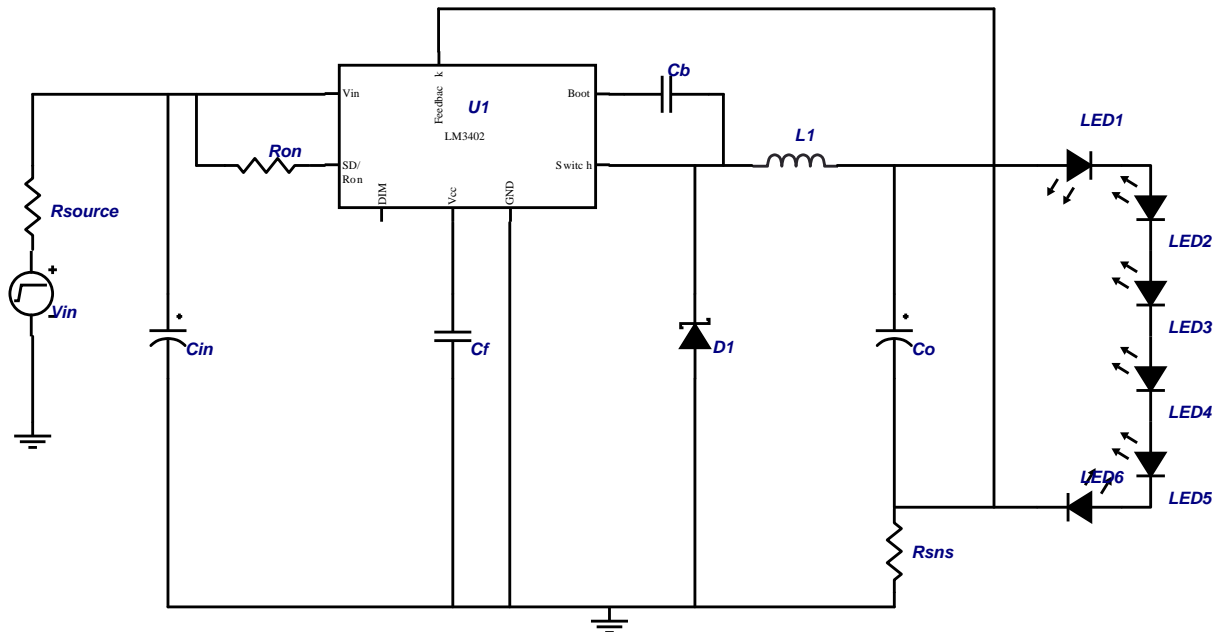
This circuit is designed to drive an array of six series-connected InGaN white LEDs (typical Vf 20.4V total) at a continuous current of 330 mA from an input of 24V +/-10%. Switching frequency is approximately 350 kHz to provide the smallest component footprint and LED ripple current possible.

Ripple current in the LED array is 2 mA pk-pk, or less than 1% of the average LED current.

To modify this design while keeping switching frequency as high as possible, follow these steps:

1. Determine duty cycle, $D = (V_f\text{ total} + 0.2V - 0.5V) / (V_{in} - 0.5V)$
2. Determine Ton, $T_{on} = 300ns / (1/D - 1)$
3. With Ton, calculate Ron, $R_{on} = (T_{on} * V_{in}) / (1.42E-10)$
4. With Ron, calculate Fsw-max, $F_{sw-max} = V_{out} / (1.42E-10 * R_{on})$

3.0 Schematic



689758_1362_0

FIGURE 1. Example Schematic Showing Connection for all Components.

4.0 Bill Of Materials

Part	Manufacturer	Part#	Attributes
Cb	Vishay	VJ0805Y103KXXAT	10n F
Cf	Vishay	VJ0805Y104KXXAT	100n F
Cin	TDK	C3225X7R1H225M	NumCaps=1, 2.2u F
Co	TDK	C3225X7R1E475M	4.7u F
D1	Central Semiconductor	CMSH1-40M	0.5 V

Part	Manufacturer	Part#	Attributes
L1	TDK	SLF7045T-470MR75	47u H, 0.15 Ohms
Ron	Vishay	CRCW08054873F	487k Ohms
Rsns	Panasonic	ERJ6BQFR56V	0.56 Ohms
U1	National Semiconductor	LM3402	

National does not assume any responsibility for use of any circuitry described, no circuit patent licenses are implied and National reserves the right at any time without notice to change said circuitry and specifications.

For the most current product information visit us at www.national.com.

LIFE SUPPORT POLICY

NATIONAL'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT AND GENERAL COUNSEL OF NATIONAL SEMICONDUCTOR CORPORATION. As used herein:

- Life support devices or systems are devices or systems which,
 - are intended for surgical implant into the body, or
 - support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
- A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

BANNED SUBSTANCE COMPLIANCE

National Semiconductor certifies that the products and packing materials meet the provisions of the Customer Products Stewardship Specification (CSP-9-111C2) and the Banned Substances and Materials of Interest Specification (CSP-9-111S2) and contain no "Banned Substances" as defined in CSP-9-111S2.

Leadfree products are RoHS compliant.



National Semiconductor Americas Customer Support Center
 Email: new.feedback@nsc.com
 Tel: 1-800-272-9959

National Semiconductor Europe Customer Support Center
 Fax: +49 (0) 180-530-85-86
 Email: europe.support@nsc.com
 Deutsch Tel: +49 (0) 69 9508 6208
 English Tel: +49 (0) 870 24 0 2171
 Français Tel: +33 (0) 1 41 91 8790

National Semiconductor Asia Pacific Customer Support Center
 Email: ap.support@nsc.com

National Semiconductor Japan Customer Support Center
 Fax: 81-3-5639-7507
 Email: jpn.feedback@nsc.com
 Tel: 81-3-5639-7560